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CHARTING THE GROWTH OF ENTREPRENEURSHIP: A CITATION ANALYSIS OF *FER* CONTENT, 1981-2008

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ABSTRACT

Since 1981 the Babson College Entrepreneurship Research Conference (BCERC) has published cutting edge entrepreneurship research. Using bibliometric techniques, this study examined the 3395 items included in *Frontiers of Entrepreneurship Research (FER),* the BCERC proceedings, between 1981 and 2008. The results show that entrepreneurship is a highly collaborative, interdisciplinary field with an increasingly international focus. The results offer an understanding of the demographic, institutional, and topical trends within the field. This research provides valuable insights into the structure of entrepreneurship that librarians can use to provide better assistance to their entrepreneurship scholars.

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INTRODUCTION

Entrepreneurship as an academic discipline is relatively young. The first academic course in entrepreneurship, Management of New Business Ventures, was taught by Myles Mace at Harvard University in 1947. Cruikshank (2005) thoroughly describes the beginnings of entrepreneurship education at Harvard. Since that time, the field has grown exponentially. This paper examines the growth of academic research in entrepreneurship through the lens of *Frontiers of Entrepreneurship Research* (*FER*), the conference proceedings of the Babson College Entrepreneurship Research Conference (BCERC), which started in 1981 and is generally considered to be the premier conference for entrepreneurship research.

This paper examines bibliometric characteristics of all the items published in *FER* between 1981 and 2008. The conference proceedings have grown in both amount of content and authorship. The first volume of *FER* in 1981 included 35 articles; the 2008 volume includes over 200 articles and abstracts. This paper uses bibliometric analysis to examine the changes in authorship, institutional affiliation and subject focus in *FER* from 1981 to 2008. The results provide an understanding of the evolution of entrepreneurship as an academic discipline and present a longitudinal view of the demographic, institutional and subject changes in the field over the past three decades. These results also provide librarians with information about the field of entrepreneurship that can be used in meeting the needs of entrepreneurship programs at their

institution in the areas of collection development, collaboration with teaching faculty and outreach to entrepreneurs.

LITERATURE REVIEW

As an academic discipline, entrepreneurship is relatively young. Since the first class offering in 1947, the field has seen impressive growth. Cooper, Hornaday and Vesper (1997) discuss the early growth of the field through individual courses. Gartner and Vesper (1997) point out that in 1985 there were 253 college courses in entrepreneurship and in 1993 441 courses were available. Katz's (2003) history of entrepreneurship education in the United States estimated that there are "more than 2200 courses at over 1600 colleges." The Princeton Review (2011) listed more than 80 academic programs offering undergraduate majors in entrepreneurship.

As entrepreneurship has expanded as a field, so has the debate about how the field is evolving. The discussion includes: normative questions about the research (how is research conducted, Venkatamaran (1997) Fried (2003)); methodological questions (what methods are used to study entrepreneurship, Busenitz, *et al.* (2003)); and disciplinary questions (Is entrepreneurship a distinct discipline, or is it an interdisciplinary field? Gartner (1990), Shane and Venkatamaran (2000)). In addition to examining the parameters of the entrepreneurship, research has also explored the structure of the field.

There are a number of studies that use co-citation analysis to explore the intellectual structure of entrepreneurship. Déry and Toulouse (1996) evaluated the social structure of entrepreneurship research using articles from the *Journal of Business Venturing* and compiled a list of the most frequently cited publications. Grégoire, Noël, Déry & Béchard (2006) examined the growth of entrepreneurship as a field and discussed its "disciplinary convergence," e.g., how strands of parent disciplines converge to form the discipline of entrepreneurship. Their study explained, in

part, the growth of research areas within entrepreneurship. Reader and Watkins (2006) examined the relationships between 78 entrepreneurship researchers and identified "groups of scholars whose work falls into similar areas." They concluded that there are a number of research themes in entrepreneurship and that scholars with similar interests tend to work together closely. Schildt, Zahra &, Sillanpää, (2006) examined citations from over 700 entrepreneurship articles and identified 25 different research strands in the field, concluding that entrepreneurship would be hindered from developing as a discipline because of this fragmentation in research front and the relationship between entrepreneurship and other disciplines. Their work is similar to Agarwal and Hoetker (2007) who studied changes in the disciplinary focus of management literature, but concluded that there is "support for the maturing of management as a discipline."

In addition to work done by entrepreneurship researchers about the field, information science scholars are also interested in entrepreneurship, primarily looking at questions of how disciplines grow and develop. One way of viewing that growth is to chart the development of newer research areas. The literature discussing the growth of research areas is voluminous and covers the spectrum of social science and science areas. Porter and Rafols (2009) provide an example for research growth in the sciences; Ireland and Webb (2007) explore entrepreneurship research taking place in other disciplines, including accounting, anthropology, political science and psychology.

Bibliometric methods, including co-citation analysis, content analysis, and journal ranking studies, are all used to explore the characteristics of evolving fields of knowledge. Substantial introductions to bibliometric methods can be found in White and McCain (1989) and Borgman and Furner (2002). Morris and Van der Veer Martens (2008) discuss the methodological framework for studying research specialties, while Cassilas & Acedo (2007) provide a specific

example of bibliometric evaluation of a single journal title. This research follows in the latter's tradition, where the content of a single source is analyzed as a way of making inferences about research patterns. It also shares methodological roots with research about the intellectual structure of strategic management research (Ramos-Rodriguez & Ruiz-Navarro, 2004).

The distinction between disciplinary and interdisciplinary research areas is an important one for information scientists and there is no shortage of research on the topic. Disciplines, as described by Salter & Hearn (1996), have both a core of knowledge and a means for producing new knowledge. Interdisciplinary subjects draw their knowledge from a core set of disciplines, and may over time develop theoretical paradigms and methods that evolve into new disciplinary areas. Ponzi (2002) and Rinia, *et al.* (2002) discuss interdisciplinary trends in management and in science fields respectively. General introductions to interdisciplinary research in the social sciences and sciences can be found in Kline (1996) and Ostreng (2010). Van den Besselar and Heimeriks (2001) examine the varying types of interdisciplinary areas and propose an indicator of interdisciplinarity "based on the patterns and intensity of knowledge streams between research fields."

Nisonger (1992) provides an introduction to the use of bibliometric methods in libraries. Borgman & Furner (2002) present an extensive review of the literature of bibliometrics and scholarly communication. Research that explores the disciplinary roots of a field serves a number of purposes for librarians. Interdisciplinary subject areas provide librarians with challenges for both reference and collection management activities. Paris (2003) examines the functional requirements necessary for libraries to better support interdisciplinary researchers. Reference, collection development, and instructional activities can be more challenging for interdisciplinary areas because the boundaries of the subject are fuzzy and cross disciplinary areas. This means

that doing a comprehensive literature review, for example, may mean looking in multiple databases instead of one.

METHODOLOGY

The dataset for this project consisted of all items published in *FER* from 1981 to 2008 inclusive - a total of 3395 items. Each volume of *FER* includes a combination of full-length articles, summaries of research and summaries of interactive presentations and poster sessions. This research follows the method of Quinones-Vidal, *et al.* (2004), and Kirchler and Hölzl (2006) who studied interdisciplinary growth in the areas of social psychology and economic psychology respectively. Grégoire, Noël, Déry & Béchard's (2006) co-citation analysis of citations to *FER* articles included far fewer items from *FER* than this research because only about twenty percent of the items in *FER* are complete articles, the rest are abstracts of research presented at the conference.

By contrast, this research includes information from all the articles and summaries in *FER* as the data set. The data collected included information about type of content (article, summary, interactive paper), authorship characteristics (single or multi authored, number of authors), institutional collaboration (single, multiple) and country collaboration (single or multiple). Data were also collected about authors' institutional affiliation (school name, country, state (if US)) and the subject category assigned to each item.

After completing data collection, cleanup was necessary before data analysis could begin. Institution names needed to be standardized. In some cases, where the institution was a government agency or other organization, the information about the institution needed to be verified so that the correct country code could be applied. Standardization was also done to subject areas.

Each volume of *FER* is arranged by subject, with between 20 and 30 different subjects covered in each annual volume. Subject names were similar but not necessarily consistent from volume to volume, and not all subjects were included in every volume. For this study, the subjects were categorized into twenty-two subject areas that define the subjects as found in the individual volumes of *FER.* For example, the subjects "corporate entepreneurship," "corporate ventures," "industry," and "intrapreneurship" were all assigned to the subject "Corporate Entrepreneurship." Similarly, the subjects "Family," "Family Firms," and "Family Enterprise" were assigned to the subject "Family."

RESULTS

The results show that *FER* has grown tremendously as a vehicle for entrepreneurship research since its initial volume in 1981. The first volume contained 39 articles; the 2008 volume contained more than 200 articles and summaries of research. From 1981 to 1984, *FER* only published full-length articles. Starting in 1985, FER started including article summaries, and in 1994 poster sessions or interactive papers were added. All of the papers accepted for BCERC are presented at the conference; however, articles are only considered for inclusion in the proceedings if they are completed prior to the conference. Completed papers are reviewed by the editors, who make the final decisions about the articles that appear in that years' proceedings. Poster /interactive paper session are shorter with a more informal presentation format and are better suited for research that is in progress, although authors are encouraged to bring a finished manuscript if one is available.

The growth in the amount of content in *FER* by type of presentation is shown in Figure 1. Articles included in *FER* are selected by an editorial board, and, while the number of total items in the proceedings has grown over the years, the number of articles published has remained fairly

consistent. Summaries of research have contributed the most to the increasing number of publications in *FER.* Since 2002, the number of items published in *FER* has ranged between 200 and 235.

Figure 2 shows the proportion of contributions by type of publication. About 40 items in each proceedings volume are full-length articles, but their percentage of the total publications in *FER* has dropped as more research summaries numbers increased. Summaries of research have garnered a larger share of the publications since 1992 (averaging near 60%) and are demonstrative of the growth of BCERC as an influential conference. The poster/ interactive category broke above 20% of the conference contributions in 2005.

Authorship Trends

Table 1 shows trends in authorship by quartile. It is clear that collaboration is a key component of research submitted to *FER* – 75% of articles are multi-authored (n=2548). Of the multi-authored submissions, 49% (n=1236) come from authors who work together at the same institution. This is not a surprising result, since colleagues at an institution are more likely to co-author research together. More interesting is that 33% (n=835) of the research is co-written authors at different institutions in the same country, pointing to a cross-fertilization of ideas across institutions. While the percentage in intra-country collaboration has stayed stable across quartiles, the absolute numbers have increased from 62 for the period 1981-1987 to 377 for the period 2002-2008. Contributions by individual authors were not tracked for this study, so there are no metrics for the number of individual authors represented in *FER*, only for the number of contributors.

The number of authors per paper has ranged from 1.79 in the 1981-1987 quartile to 2.28 in the 2002-2008 quartile. Since the 1988-1994 period the average number of authors per paper has

increased by only 0.09. Papers with single authors account for 25% (n=851) of the total papers, as do papers by three authors (n=838). Contributions by two authors are most prevalent with 42% (n=1410), and works with four or more authors represent 8% (n=296) of the publications.

The most interesting trends from data about multi-authored articles concern the growth in collaborations by authors from different countries. Overall, 19% (n=477) items include authors from different countries, but that doesn't reflect growth in inter-country research. From 1981-1987 to 2002-2008 quartiles the numbers of inter-country grew from 9 items to 295, reflecting the increasing internationalization of entrepreneurship research. Table 2 shows the country affiliations of authors submitting to *FER*. Authors from 63 countries have published in *FER*, ranging from 16 countries during 1981-1987 to 55 countries in the period 2002-2008. This increase in international contributions may also be the result of a decision, early in the history of BCERC to hold every third conference overseas, which necessarily increased international submissions.

Institutional Trends

Over the twenty-eight years included in this study, research has been contributed by 942 institutions in 63 countries. Contributions from the United States account for 45% (n=418) of those institutions; international institutions contributed 55% (n=524). Of those schools providing research, the top 25 US and international schools contributed 40% of *FER* authors; the top 100 schools contributed 71% of authors.

Forty percent of all schools (n=378) contributed only one item to *FER*. The top 25 US and international institutions by number of authors contributing research is shown is Table 3. Table 4 shows the authorship contributions as a percent of total contributors for the top 10, 25, 50 and 100 schools for both the US and internationally. For both sets of schools, the top 100 schools

contributed about 70% of the total authors. Since individual authors were not tracked, there is no way to tell how many authors are represented multiple times..

Subject Trends

As was mentioned in the methodology section, the subject areas included in *FER* vary yearly. While there is an overlap of topics, the wording used from year to year might vary. The database created for this project included all the variant subject listings, and these were then standardized into 22 different subject areas. Table 5 shows the subject categories and frequencies of publication by quartile.

Over the years the focus of contributions has changed. The top five topics overall are entrepreneurial characteristics, startup companies, venture capital, management and corporate entrepreneurship. Management is ranked fourth overall but was included as a top five category in only one quartile – 189 of the 214 items about management occurred in the last two quartiles. Two other topics, strategy and women in entrepreneurship, show marked increases in the last two quartiles, an indication of changes in the research focus within the field.

As a measure of topic diversity, the share of publications contributed by the top five topics per quartile was analyzed. The top-five share declined from 70% in the period 1981-1987 to 46% in the period 2002-2008, indicating an increase in topic diversity. The Hirschmann-Herfindahl index – HHI – (Hirschmann, 1964) was also computed as a secondary measure of topic diversity. This index also shows a downward trend from 1188 during 1981-1987 to 691 during 2002-2008, indicating greater diversity of topics.

While publication share and HHI show that there is increased diversity in topic in *FER*, several topics were consistently addressed. Two topics, entrepreneurship characteristics and startup companies, were included in top-five topics in each quartile. Venture capital was

included in three quartiles, and international aspects and corporate entrepreneurship were included in two quartiles. There are also topics that were not a major focus of research. These include bank financing, social entrepreneurship, and research related to family businesses.

The number of years a subject has been included in *FER* is an additional measure of subject diversity. Subject persistence is calculated by dividing the number of years a subject has been included by 28, the total number of *FER* volumes in the sample. Table 6 gives details about subject persistence. Of the 22 topic areas, 15 were included in fewer than 70% of the *FER* volumes. The top five topic most persistently covered (n=number of years included) in *FER* are entrepreneurial characteristics and startup companies (n=27, 96% each), venture capital (n=24, 86%), international aspects (n=23, 82%) and corporate entrepreneurship (n=22, 79%). Only two other topics, women in entrepreneurship (n=21, 75%) and allies (n=20, 71%) were included in more than 70% of the proceedings volumes. It is interesting to note the differences in rankings between the total publications and articles. This difference may be due to an increased emphasis on the part of proceedings editors about certain subject areas.

DISCUSSION AND IMPLICATIONS

The results from this research show that there has been steady and continued interest in entrepreneurship over the past three decades. There are a number of areas where librarians can leverage the results from this research in meeting the needs of entrepreneurship programs at their institution. Specifically, librarians can focus on collection development (how can librarians best collect entrepreneurship materials?), teaching and collaboration with faculty (how can librarians provide academic support?) and outreach (how can librarians provide services to entrepreneurs?) to provide more effective services to entrepreneurship researchers.

This research provides important information for librarians collecting materials for entrepreneurship programs. The primary areas of interest identified in this study were entrepreneurial characteristics, startup companies, venture capital, and management of entrepreneurial ventures. The BCERC proceedings focus on advancing entrepreneurship as an academic discipline and emphasize intellectual rigor and theoretical perspectives and there is little discussion of applied entrepreneurship. These interest areas can provide a starting point for collection development activities, particularly for librarians who support doctoral programs in entrepreneurship where the focus is academic rather than applied entrepreneurship.

Librarians who support programs providing applied entrepreneurship classes may want to focus more of their collections on practitioner-oriented materials. Applied entrepreneurship programs are more pedagogical and focus on the mechanics of becoming an entrepreneur (e.g., business plan writing, feasibility analysis). Martin (2010) includes a bibliography of practitioner-oriented materials.

Another way to approach collection development is to view entrepreneurship as a set of core competencies that define entrepreneurs, and collect materials that, in addition to meeting curricular needs on an institution, support those competencies. Table 7 describes and defines the competencies, which are elaborated on in a recent publication by Morris (2011). These core competencies include knowledge about opportunity recognition, innovation, creative problem solving, and risk mitigation. Using these subjects as a supplement to traditional entrepreneurship subjects can provide breadth to a library's entrepreneurship collection.

Core competencies can also inform teaching and collaborative activities with faculty. Iowa State University uses the competencies described above to determine which elective courses are included in the entrepreneurial studies minor (Iowa State University, 2011). While core

entrepreneurship courses centered in the business school, electives for the minor include courses from agronomy, design, engineering (electrical, industrial and mechanical) and hospitality management, all of which include one or more of the entrepreneurial attributes.

Entrepreneurial competencies can assist librarians in identifying courses and faculty who may benefit from the libraries assistance with course instruction in entrepreneurship.
It is important to recognize that aspects of entrepreneurship occur in many classes and that librarians need to be aware of the ways that entrepreneurship is presented at their institution.

Other collaborative activities can arise from librarians working as liaisons with departments or being involved in classroom learning. Chung (2010) explains how working as a liaison for a campus entrepreneurship initiative provided opportunities to build relationships with faculty that led to later collaborations. Campbell and Cook (2010) describe their collaboration with faculty in an experiential learning course, where they visited the class three times over the course of the semester instead of doing a one-time presentation. By becoming more involved with the course, they provided a better learning outcomes for the students. Collaborating with faculty in classes has the potential to transform the experience of students. Examples of collaborations range from a one-time class presentation to librarians being involved in developing and grading course exercises.

Outreach to entrepreneurs is another way that librarians can provide more effective services to their users. A special *JBFL* issue on entrepreneurship published in 2010 elaborated on how libraries can be involved in outreach efforts beyond their campus. Fitzgerald, Anderson & Kula (2010) described their experience working with the MaRS Discovery District providing market intelligence services to science and technology entrepreneurs. They focus on the synergies resulting from their institution (University of Toronto) partnering with MaRS. Leavitt, Hamilton-Pennell & Fails (2010) describe a project in Michigan that included a range of libraries and economic

development agencies. Their conclusion is that the project was successful, but that there are challenges in scaling collaborative projects with multiple partners. The challenge for librarians is to identify opportunities to collaborate with outside groups to provide information resources and services that are both needed and valued by entrepreneurs and the organizations that serve them.

This research could be extended by research involving citation analysis of articles in entrepreneurship, whether it uses the BCERC proceedings as data or another article sample (such as search results from Web of Science or ABI/Inform). There are a number of other examples of citation analysis studies that have been done using the entrepreneurship literature, all of which originate in the business literature (Dos Santos, Holsapple & Ye, 2011; Granados, Hlupic, Coakes & Mohamed, 2010; Romano & Ratnatunga, 2006). The methodologies of these studies are different from those usually seen in the library literature and applying the results to library-specific situations can be challenging. An exception is Teixera's (2011) recent citation study of entrepreneurship literature which includes a list of the top 130 cited sources in entrepreneurship research. Additional research that explores citation characteristics of entrepreneurship and their implications for collection development and reference service will better equip librarians to meet the needs users with entrepreneurship queries.

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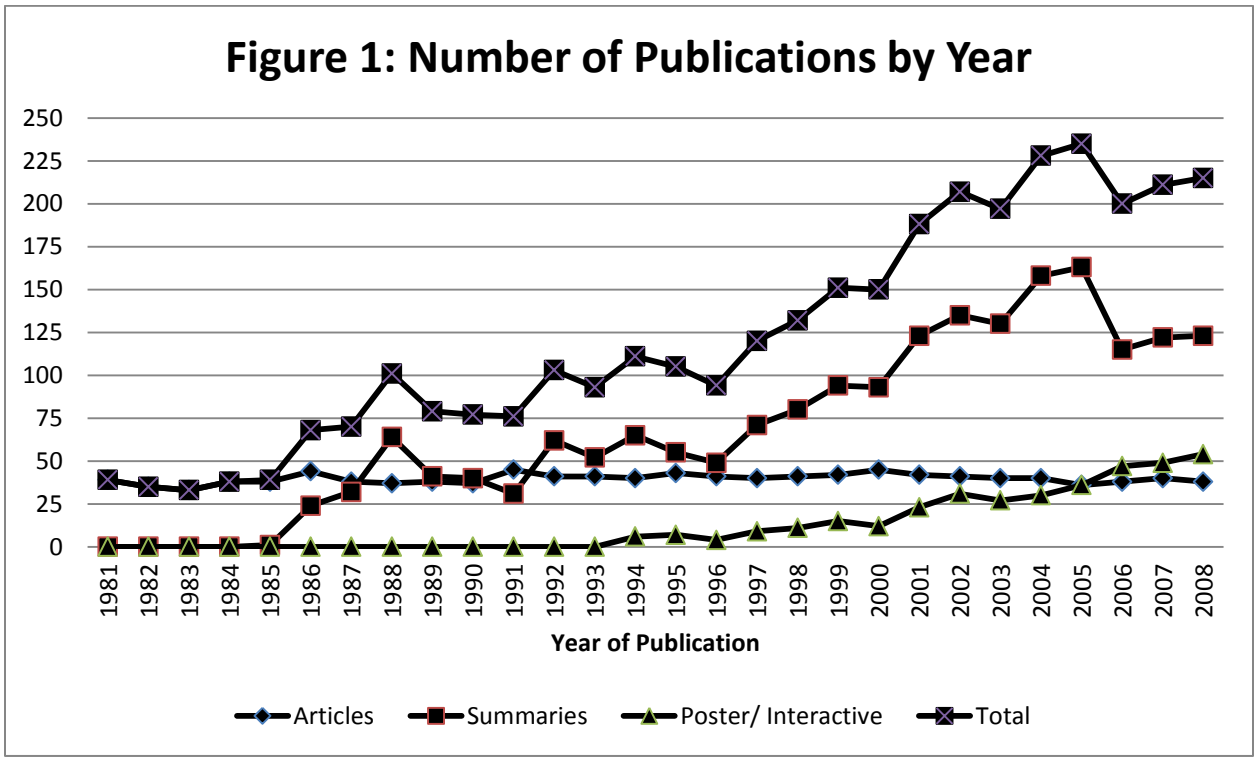
Figure 1: Number of Publications by Year
250
225
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Summaries
Poster/ Interactive
Total

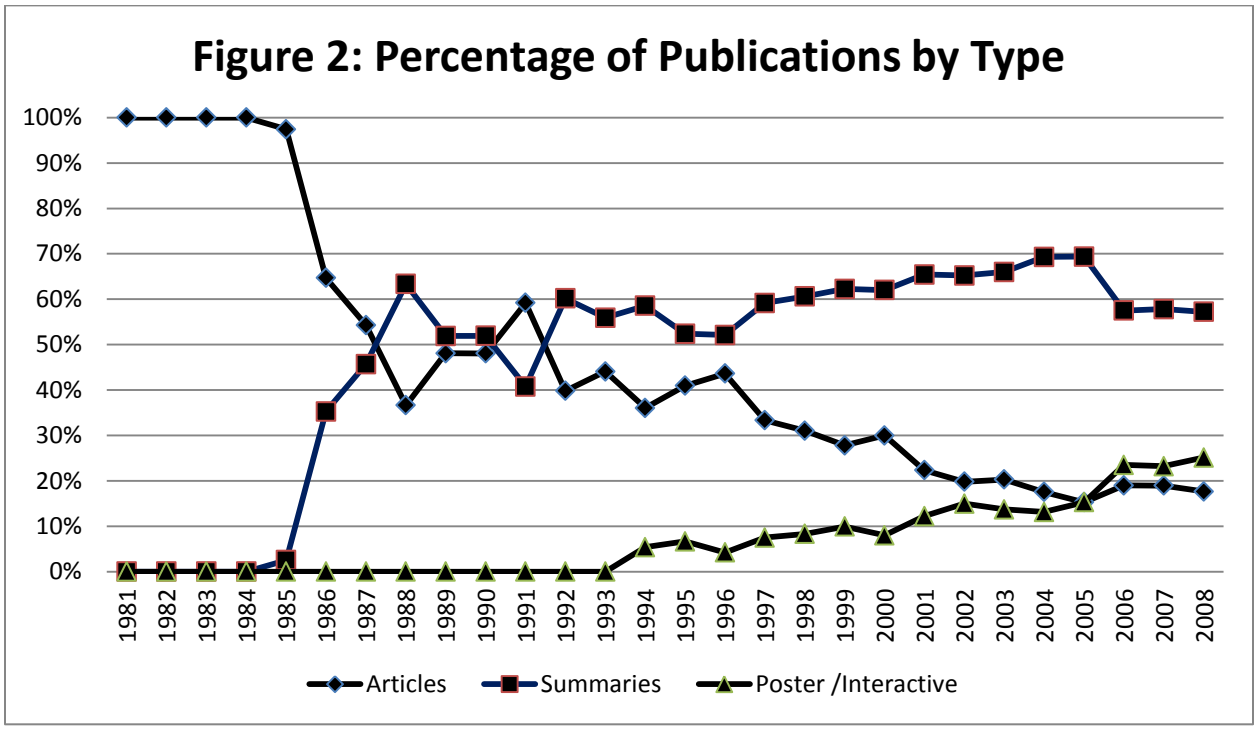
Figure 2: Percentage of Publications by Type
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Articles
Summaries
Poster /Interactive

Table 1: Authorship Characteristics by Quartile

Article Type:	1981-1987		1988-1994		1995-2001		2002-2008		Total	
	N	%	N	%	N	%	N	%	N	%
Single Author	141	44	166	26	219	23	321	22	847	25
Multiple Author	181	56	474	74	721	77	1172	78	2548	75
Total	322	100	640	100	940	100	1493	100	3395	100

Multiple Author Detail	1981-1987		1988-1994		1995-2001		2002-2008		Total	
	N	%	N	%	N	%	N	%	N	%
Single Institution: Single Country	110	61	277	58	349	48	500	43	1236	49
Multiple Institution: Single Country	62	35	142	30	254	35	377	32	835	33
Multiple Institution: Multiple Country	9	4	55	12	118	16	295	25	477	19
Multiple Author Subtotal	181	100	474	100	721	100	1172	100	2548	100

Table 2: Country Affiliations of Contributors, 1981-2008

	1981-1987	1988-1994	1995-2001	2002-2008	Total
Europe	46	261	611	1395	2313
Austria		2		8	10
Belgium		4	34	107	145
Bulgaria			1	1	2
Croatia				1	1
Czech Republic		1	6		7
Denmark		2	7	14	23
Estonia				1	1
Finland		9	55	82	146
France	1	33	37	57	128
Germany	4	10	26	184	224
Greece			2	3	5
Hungary		2	1	2	5
Iceland				4	4
Ireland	5	4	25	24	58
Italy	1	18	12	30	61
Latvia				1	1
Moldova				2	2
Netherlands	1	2	28	133	164
Norway	2	2	18	52	74
Poland		2	2	14	18
Portugal			1	20	21
Russia				1	1
Slovenia			13	29	42
Spain		7	2	62	71
Sweden	20	39	92	173	324
Switzerland	1	1	3	24	29
Ukraine				2	2
United Kingdom	11	123	246	364	744
Americas	518	1071	1355	1765	4709
Argentina			4	5	9
Brazil	1	2	4	17	24
Canada	61	85	88	149	383
Chile				3	3
Colombia	1		2	1	4
Dominican Republic			1		1
Ecuador				1	1
Mexico			1	6	7
Puerto Rico				2	2
United States	455	984	1255	1580	4274
Uruguay				1	1

Table 2: Country Affiliations of Contributors, 1981-2008, cont'd

	1981-1987	1988-1994	1995-2001	2002-2008	Total
Australia / New Zealand	7	24	24	107	162
Australia	3	22	24	93	142
New Zealand	4	2		14	20
Asia	1	37	66	125	228
Bangladesh			1	1	2
China		1		16	17
Egypt	1				1
Hong Kong			2	13	15
India		3	1	12	16
Indonesia			1		1
Israel		8	11	29	48
Japan		14	21	7	42
Malaysia			9		9
Philippines			1		1
Pakistan			2		2
Singapore		8	15	21	44
South Korea		1		12	13
Sri Lanka			1	1	2
Thailand		1		4	5
Taiwan		1		6	7
Uzbekistan				2	2
Vietnam			1	1	1
Africa		4	7	7	18
Kenya				1	1
South Africa		4	6	4	14
Tanzania			1		1
Uganda				2	2
Authors by Region	1981-1987	1988-1994	1995-2001	2002-2008	Total
(n=number of authors)					
Europe	46	261	611	1395	2313
Americas	518	1071	1355	1765	4709
Australia / N. Zealand	7	24	24	107	162
Asia	1	37	66	125	229
Africa		4	7	7	18
Unknown	5	5	13	10	33
Totals	577	1402	2076	3409	7464
Countries Represented					
(n= number of countries)					
Europe	9	17	20	27	28
Americas	4	3	7	10	11
Australia / N. Zealand	2	2	1	2	2
Asia	1	8	11	13	18
Africa		1	1	3	4
Totals	16	31	40	55	63

Table 3: Top 25 US and International Institution Contributors

Rank	United States Institutions	Location	No. Authors
1	Babson College	Massachusetts	285
2	Rensselaer Polytechnic Institute	New York	140
3	University of Colorado, Boulder	Colorado	139
4	University of Minnesota	Minnesota	104
5	Baylor University	Texas	87
6	University of Illinois at Chicago	Illinois	80
7	University of New Hampshire	New Hampshire	77
8	Georgia Institute of Technology	Georgia	72
9	Purdue University	Indiana	66
10	Boston University	Massachusetts	65
11	University of North Carolina, Chapel Hill	North Carolina	64
12	Case Western Reserve University	Ohio	62
13	Georgia State University	Georgia	60
14	San Diego State University	Pennsylvania	59
15	Temple University	Pennsylvania	59
16	University of Pennsylvania	California	59
17	University of Georgia	Georgia	53
18	Ohio State University	Washington	52
19	University of Southern California	California	52
20	University of Washington	Ohio	52
21	University of South Carolina	South Carolina	51
22	Harvard University	Massachusetts	49
23	Utah State University	Utah	47
24	Indiana University	Indiana	45
25	University of Central Florida	Florida	43

Table 3: Top 25 US and International Institution Contributors, cont'd

Rank	International Institutions	Location	No. Authors
1	University of Nottingham	United Kingdom	145
2	Jonkoping International Business School	Sweden	115
3	Ghent University	Belgium	102
4	University of London	United Kingdom	84
5	Helsinki University of Technology	Finland	64
6	Erasmus University Rotterdam	Netherlands	60
7	INSEAD	France	53
8	Swinburne University of Technology	Australia	52
9	Linkoping University	Sweden	51
10	Imperial College	United Kingdom	45
11	University of Strathclyde	Scotland	45
12	Queensland University of Technology	Australia	42
13	Stockholm School of Economics	Sweden	36
14	University of Calgary	Canada	36
15	York University	Canada	35
16	Carleton University	Canada	33
17	University of Ljubljana	Slovenia	30
18	EIM Business and Policy Research	France	29
19	University of Giessen	Germany	28
20	University of Aberdeen	Scotland	27
21	University of Western Ontario	Canada	27
22	Durham University	United Kingdom	26
23	University of Jylvaskyla	Finland	26
24	University of Southampton	United Kingdom	25
25	National University of Singapore	Singapore	24

Table 4: Author Contribution Metrics

Number of Institutions	US Authors	Percent of Total Citations	International Authors	Percent of Total Citations
Top 10	1115	26%	771	24%
Top 25	1922	45%	1246	39%
Top 50	2648	62%	1748	55%
Top 100	3400	80%	2284	72%
Total	4274		3190	

Table 5: Subject Breakdown of Publications by Quartile

	1981-1987	1988-1994	1995-2001	2002-2008	All Years
Allies	4	41	47	97	189
Angel Investors	0	9	18	67	94
Bank Financing	0	0	15	9	24
Corporate Entrepreneurship	22+	27	43	111+	203+
Economic Issues	4	8	5	35	52
Education	12	35	23	19	89
Entrepreneurial Growth	7	51+	62	53	173
Entrepreneurial Characteristics	60+	126+	115+	203+	504+
Equity Financing	0	0	79+	26	105
Family	0	0	12	65	77
General Finance	0	37	21	37	95
Government/ Politics	10	16	38	24	88
International Aspects	32+	45+	34	76	187
Management	4	21	84+	105	214+
Other	0	17	21	0	38
Research	15	19	17	43	94
Social Entrepreneurship	4	3	23	22	52
Startup Companies	49+	80+	90+	152+	371+
Strategy	16	15	37	128+	196
Technology	13	29	70+	33	145
Venture Capital	61+	45+	46	117+	269+
Women in Entrepreneurship	9	16	40	71	136
Total	322	640	940	1493	3395
Percentage Contribution of the top 5 subjects	69.6%	54.2%	46.6%	47.6%	46.0%
Hirschmann-Herfindal Index	1188.03	897.33	657.03	705.22	690.87

Note: + indicates top 5 subjects within each period.

Table 6: Subject Persistence by Publication Type

Subject	All Items in *FER*					Articles Only					Summary/ Poster/ Interactive				
	Years (n=28)	Percent	# Items	Average Items	Rank	Years (n=28)	Percent	# Items	Average Items	Rank	Years (n=23)	Percent	# Items	Average Items	Rank
Allies	20	71%	189	9.45	8	17	61%	55	3.24	10	20	87%	134	6.70	8
Corporate Entrepreneurship	22	79%	203	9.23	9	19	68%	53	2.79	13	19	83%	150	7.89	7
Economic Issues	7	25%	52	7.43	14	4	14%	10	2.50	15	7	30%	42	6.00	15
Education	17	61%	89	5.24	19	10	36%	23	2.30	18	15	65%	66	4.40	19
Entrepreneurial Growth	17	61%	173	10.18	7	16	57%	67	4.19	5	16	70%	106	6.63	9
Entrpreneurial Characteristics	27	96%	504	18.67	1	26	93%	198	7.62	1	23	100%	306	13.30	1
Family	11	39%	77	7.00	15	6	21%	10	1.67	22	11	48%	67	6.09	13
Finance - Angel Investors	12	43%	94	7.83	13	9	32%	26	2.89	12	11	48%	68	6.18	12
Finance - Bank Financing	6	21%	24	4.00	20	4	14%	7	1.75	20	5	22%	17	3.40	20
Finance - General Finance Topics	11	39%	95	8.64	10	10	36%	33	3.30	9	10	43%	62	6.20	11
Finance - Venture Capital	24	86%	269	11.21	6	24	86%	123	5.13	3	18	78%	146	8.11	6
Finance -Equity Financing	8	29%	105	13.13	3	7	25%	26	3.71	7	8	35%	79	9.88	3
Government/ Politics	14	50%	88	6.29	17	9	32%	21	2.33	17	12	52%	67	5.58	18
International Aspects	23	82%	187	8.13	11	21	75%	64	3.05	11	21	91%	123	5.86	16
Management	17	61%	214	12.59	5	15	54%	64	4.27	4	16	70%	150	9.38	5
Other	11	39%	38	3.45	22	11	39%	26	2.36	16	6	26%	12	2.00	22
Research	16	57%	94	5.88	18	12	43%	24	2.00	19	12	52%	70	5.83	17
Social Entrepreneurship	13	46%	52	4.00	21	7	25%	18	2.57	14	11	48%	34	3.09	21
Startup Companies	27	96%	371	13.74	2	24	86%	136	5.67	2	21	91%	235	11.19	2
Strategy	15	54%	196	13.07	4	14	50%	51	3.64	8	15	65%	145	9.67	4
Technology	18	64%	145	8.06	12	13	46%	49	3.77	6	16	70%	96	6.00	14
Women in Entrepreneurship	21	75%	136	6.48	16	16	57%	27	1.69	21	17	74%	109	6.41	10

Table 7: Entrepreneurial Competencies

Opportunity Recognition	The ability to perceive and to act upon opportunities in the environment that other don't see; developing a set of skills that can be used to differentiate between an idea and an opportunity
Opportunity Evaluation	The ability to use processes to evaluate an opportunity (e.g., feasibility analysis, market analysis) for the purpose of deciding whether or not to pursue an opportunity
Innovation	Creating new or novel ideas, offerings, processes, unique combinations
Creative Problem Solving	Ability to examine standard situations or problems in new ways
Mitigating Risk	Being a calculated risk-taker; managing risk
Thinking and Acting as a Guerrilla	Taking unconventional approaches to examining problems and developing solutions
Resource Leveraging	The ability to assess and acquire necessary resources
Managing Ambiguity and Uncertainty	Being able and comfortable to address problems in loose and ambiguous contexts
Implementation of Change	The ability to create and manage change
Building a Plan for an Innovative Concept	The capacity to create and build something from practically nothing
Entrepreneurial Process	Identify an opportunity; develop a business concept; assess the required resources; acquire the necessary resources; implement and manage; harvest the venture